

1. A method of sealing pipe or forming a barrier in a well bore comprising the steps of:

(a) preparing or providing a hardenable, low density sealing composition comprising a hardenable furan liquid resin mixture, an organosilane coupling agent, a cationic surfactant, and hollow microspheres;

(b) placing said sealing composition in said well bore; and

(c) allowing said sealing composition to harden into an impermeable mass.

2. The method of claim 1 wherein said hardenable furan liquid resin mixture comprises a 2-furanmethanol homopolymer present in said mixture in an amount in the range of from about 55% to about 60% by weight thereof and furfuryl alcohol present in said mixture in an amount in the range of from about 40% to about 45% by weight thereof.

3. The method of claim 1 wherein said hardenable furan liquid resin mixture is present in said sealing composition in an amount in the range of from about 10% to about 50% by weight thereof.

4. The method of claim 1 wherein said organosilane coupling agent is selected from the group consisting of N-2-(aminoethyl)-3-aminopropyltrimethoxysilane, 3-glycidoxypropyltrimethoxysilane and n-beta(aminoethyl)-gamma-aminopropyltrimethoxysilane.

5. The method of claim 1 wherein said organosilane coupling agent is N-2-(aminoethyl)-3-aminopropyltrimethoxysilane.

6. The method of claim 1 wherein said organosilane coupling agent is present in said sealing composition in an amount in the range of from about 0.1% to about 3% by weight thereof.

7. The method of claim 1 wherein said cationic surfactant is selected from the group consisting of ethoxylated nonyl phenol phosphate ester, C<sub>12</sub>-C<sub>22</sub> alkyl phosphonates and mixtures of one or more cationic surfactants and one or more non-ionic surfactants.

8. The method of claim 1 wherein said cationic surfactant is a C<sub>12</sub>-C<sub>22</sub> alkyl phosphonate.

9. The method of claim 1 wherein said cationic surfactant is present in said sealing composition in an amount in the range of from about 0.1% to about 10% by weight thereof.

10. The method of claim 1 wherein said hollow microspheres are selected from the group consisting of hollow mineral glass spheres, hollow silica-alumina spheres, glass spheres and ceramic spheres.

11. The method of claim 1 wherein said hollow microspheres are mineral glass spheres.

12. The method of claim 1 wherein said hollow microspheres are present in said sealing composition in an amount in the range of from about 5% to about 50% by weight thereof.

13. The method of claim 1 wherein said sealing composition further comprises a solvent or diluent selected from the group consisting of 2-butoxy ethanol, butyl acetate, furfuryl acetate and mixtures thereof.

14. The method of claim 13 wherein said sealing composition is furfuryl acetate.
15. The method of claim 13 wherein said solvent or diluent is present in said sealing composition in an amount in the range of from about 5% to about 60% by weight thereof.
16. The method of claim 1 wherein said sealing composition further comprises a dispersing agent selected from the group consisting of naphthalene-sulfonate-formaldehyde condensate, acetone-formaldehyde-sulfite condensate and glucano-delta-lactone.
17. The method of claim 16 wherein said dispersing agent is naphthalene-sulfonate-formaldehyde condensate.
18. The method of claim 16 wherein said dispersing agent is present in said sealing composition in an amount in the range of from about 0.1% to about 10% by weight thereof.
19. The method of claim 1 wherein said sealing composition further comprises a lightweight filler selected from the group consisting of amorphous silica, fumed silica, diatomaceous earth, and fly ash.
20. The method of claim 19 wherein said lightweight filler is amorphous silica.
21. The method of claim 19 wherein said lightweight filler is present in said sealing composition in an amount in the range of from about 5% to about 50% by weight thereof.
22. The method of claim 1 wherein said sealing composition further comprises sand.
23. The method of claim 22 wherein said sand has a mesh size in the range of from about 70 mesh to about 140 mesh.

24. The method of claim 22 wherein said sand is present in said sealing composition in an amount in the range of from about 5% to about 30% by weight thereof.

25. The method of claim 1 wherein said sealing composition further comprises a delayed catalyst for causing said sealing composition to harden selected from the group consisting of encapsulated hydrochloric acid, encapsulated maleic acid, encapsulated salicylic acid and encapsulated sodium bisulfate.

26. The method of claim 25 wherein said delayed catalyst is encapsulated sodium bisulfate.

27. The method of claim 25 wherein said delayed catalyst is present in said sealing composition in an amount in the range of from about 0.1% to about 5% by weight thereof.

28. A hardenable, low density sealing composition comprising:

a hardenable furan liquid resin mixture;

an organosilane coupling agent;

a cationic surfactant; and

hollow microspheres.

29. The sealing composition of claim 28 wherein said hardenable furan liquid resin mixture comprises a 2-furanmethanol homopolymer present in said mixture in an amount in the range of from about 55% to about 60% by weight thereof and furfuryl alcohol present in said mixture in an amount in the range of from about 40% to about 45% by weight thereof.

30. The sealing composition of claim 28 wherein said hardenable furan liquid resin mixture is present in an amount in the range of from about 10% to about 50% by weight thereof.

31. The sealing composition of claim 28 wherein said organosilane coupling agent is selected from the group consisting of N-2-(aminoethyl)-3-aminopropyltrimethoxysilane, 3-glycidoxypropyltrimethoxysilane and n-beta(aminoethyl)-gamma-aminopropyltrimethoxysilane.

32. The sealing composition of claim 28 wherein said organosilane coupling agent is N-2-(aminoethyl)-3-aminopropyltrimethoxysilane.

33. The sealing composition of claim 28 wherein said organosilane coupling agent is present in an amount in the range of from about 0.1% to about 3% by weight thereof.

34. The sealing composition of claim 28 wherein said cationic surfactant is selected from the group consisting of ethoxylated nonyl phenol phosphate ester, C<sub>12</sub>-C<sub>22</sub> alkyl phosphonates and mixtures of one or more cationic surfactants and one or more non-ionic surfactants.

35. The sealing composition of claim 28 wherein said cationic surfactant is a C<sub>12</sub>-C<sub>22</sub> alkyl phosphonate.

36. The sealing composition of claim 28 wherein said cationic surfactant is present in an amount in the range of from about 0.1% to about 10% by weight thereof.

37. The sealing composition of claim 28 wherein said hollow microspheres are selected from the group consisting of hollow mineral glass spheres, hollow silica-alumina spheres, glass spheres and ceramic spheres.

38. The sealing composition of claim 28 wherein said hollow microspheres are mineral glass spheres.

39. The sealing composition of claim 28 wherein said hollow microspheres are present in an amount in the range of from about 5% to about 50% by weight thereof.

40. The sealing composition of claim 28 which further comprises a solvent or diluent selected from the group consisting of 2-butoxy ethanol, butyl acetate, furfuryl acetate and mixtures thereof.

41. The sealing composition of claim 40 wherein said solvent or diluent is furfuryl acetate.

42. The sealing composition of claim 40 wherein said solvent or diluent is present in an amount in the range of from about 5% to about 60% by weight thereof.

43. The sealing composition of claim 28 which further comprises a dispersing agent selected from the group consisting of naphthalene-sulfonate-formaldehyde condensate, acetone-formaldehyde-sulfite condensate and glucano-delta-lactone.

44. The sealing composition of claim 43 wherein said dispersing agent is naphthalene-sulfonate-formaldehyde condensate.

45. The sealing composition of claim 43 wherein said dispersing agent is present in an amount in the range of from about 0.1% to about 10% by weight thereof.

46. The sealing composition of claim 28 which further comprises a lightweight filler selected from the group consisting of amorphous silica, fumed silica, diatomaceous earth, and fly ash.

47. The sealing composition of claim 46 wherein said lightweight filler is amorphous silica.

48. The sealing composition of claim 46 wherein said lightweight filler is present in an amount in the range of from about 5% to about 50% by weight thereof.

49. The sealing composition of claim 28 which further comprises sand.

50. The sealing composition of claim 49 wherein said sand has a mesh size in the range of from about 70 mesh to about 140 mesh.

51. The sealing composition of claim 49 wherein said sand is present in an amount in the range of from about 5% to about 30% by weight thereof.

52. The sealing composition of claim 28 which further comprises a delayed catalyst for causing said sealing composition to harden selected from the group consisting of encapsulated hydrochloric acid, encapsulated maleic acid, encapsulated salicylic acid and encapsulated sodium bisulfate.

53. The sealing composition of claim 52 wherein said delayed catalyst is encapsulated sodium bisulfate.

54. The sealing composition of claim 52 wherein said delayed catalyst is present in an amount in the range of from about 0.1% to about 5% by weight thereof.